

(3) Span the HC analyzer using  $C_3H_8$  span gas introduced at the analyzer port.

(4) Overflow zero air at the HC probe inlet or into a tee near the outlet of the probe.

(5) Measure the stable HC concentration of the HC sampling system as overflow zero air flows. For batch HC measurement, fill the batch container (such as a bag) and measure the HC overflow concentration.

(6) If the overflow HC concentration exceeds  $2 \mu\text{mol/mol}$ , do not proceed until contamination is eliminated. Determine the source of the contamination and take corrective action, such as cleaning the system or replacing contaminated portions.

(7) When the overflow HC concentration does not exceed  $2 \mu\text{mol/mol}$ , record this value as  $x_{\text{THCinit}}$  and use it to correct for HC contamination as described in § 1065.660.

(e) Perform the propane check as follows:

(1) For batch HC sampling, connect clean storage media, such as evacuated bags.

(2) Operate HC measurement instruments according to the instrument manufacturer's instructions.

(3) If you will correct for dilution air background concentrations of HC, measure and record background HC in the dilution air.

(4) Zero any integrating devices.

(5) Begin sampling, and start any flow integrators.

(6) Release the contents of the  $C_3H_8$  reference cylinder at the rate you selected. If you use a reference flow rate of  $C_3H_8$ , start integrating this flow rate.

(7) Continue to release the cylinder's contents until at least enough  $C_3H_8$  has been released to ensure accurate quantification of the reference  $C_3H_8$  and the measured  $C_3H_8$ .

(8) Shut off the  $C_3H_8$  reference cylinder and continue sampling until you have accounted for time delays due to sample transport and analyzer response.

(9) Stop sampling and stop any integrators.

(f) Perform post-test procedure as follows:

(1) If you used batch sampling, analyze batch samples as soon as practical.

(2) After analyzing HC, correct for contamination and background.

(3) Calculate total  $C_3H_8$  mass based on your CVS and HC data as described in § 1065.650 and § 1065.660, using the molar mass of  $C_3H_8$ ,  $M_{C_3H_8}$ , instead the effective molar mass of HC,  $M_{HC}$ .

(4) If you use a reference mass, determine the cylinder's propane mass within  $\pm 0.5\%$  and determine the  $C_3H_8$  reference mass by subtracting the empty cylinder propane mass from the full cylinder propane mass.

(5) Subtract the reference  $C_3H_8$  mass from the calculated mass. If this difference is within  $\pm 2\%$  of the reference mass, the CVS passes this verification. If not, take corrective action as described in paragraph (a) of this section.

(g) You may repeat the propane check to verify a batch sampler, such as a PM secondary dilution system. (1) Configure the HC sampling system to extract a sample near the location of the batch sampler's storage media (such as a PM filter). If the absolute pressure at this location is too low to extract an HC sample, you may sample HC from the batch sampler pump's exhaust. Use caution when sampling from pump exhaust because an otherwise acceptable pump leak downstream of a batch sampler flow meter will cause a false failure of the propane check.

(2) Repeat the propane check described in this section, but sample HC from the batch sampler.

(3) Calculate  $C_3H_8$  mass, taking into account any secondary dilution from the batch sampler.

(4) Subtract the reference  $C_3H_8$  mass from the calculated mass. If this difference is within  $\pm 5\%$  of the reference mass, the batch sampler passes this verification. If not, take corrective action as described in paragraph (a) of this section.

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#### § 1065.342 Sample dryer verification.

(a) *Scope and frequency.* If you use a sample dryer as allowed in § 1065.145(e)(2) to remove water from the sample gas, verify the performance

upon installation, after major maintenance, for thermal chiller. For osmotic membrane dryers, verify the performance upon installation, after major maintenance, and within 35 days of testing.

(b) *Measurement principles.* Water can inhibit an analyzer's ability to properly measure the exhaust component of interest and thus is sometimes removed before the sample gas reaches the analyzer. For example water can negatively interfere with a CLD's NO<sub>x</sub> response through collisional quenching and can positively interfere with an NDIR analyzer by causing a response similar to CO.

(c) *System requirements.* The sample dryer must meet the specifications as determined in §1065.145(e)(2) for dewpoint,  $T_{\text{dew}}$ , and absolute pressure,  $p_{\text{total}}$ , downstream of the osmotic-membrane dryer or thermal chiller.

(d) *Sample dryer verification procedure.* Use the following method to determine sample dryer performance. Run this verification with the dryer and associated sampling system operating in the same manner you will use for emission testing (including operation of sample pumps). You may run this verification test on multiple sample dryers sharing the same sampling system at the same time. You may run this verification on the sample dryer alone, but you must use the maximum gas flow rate expected during testing. You may use good engineering judgment to develop a different protocol.

(1) Use PTFE or stainless steel tubing to make necessary connections.

(2) Humidify room air, N<sub>2</sub>, or purified air by bubbling it through distilled water in a sealed vessel that humidifies the gas to the highest sample water content that you estimate during emission sampling.

(3) Introduce the humidified gas upstream of the sample dryer. You may disconnect the transfer line from the probe and introduce the humidified gas at the inlet of the transfer line of the sample system used during testing. You may use the sample pumps in the sample system to draw gas through the vessel.

(4) Maintain the sample lines, fittings, and valves from the location where the humidified gas water con-

tent is measured to the inlet of the sampling system at a temperature at least 5 °C above the local humidified gas dewpoint. For dryers used in NO<sub>x</sub> sample systems, verify the sample system components used in this verification prevent aqueous condensation as required in §1065.145(d)(1)(i). We recommend that the sample system components be maintained at least 5 °C above the local humidified gas dewpoint to prevent aqueous condensation.

(5) Measure the humidified gas dewpoint,  $T_{\text{dew}}$ , and absolute pressure,  $p_{\text{total}}$ , as close as possible to the inlet of the sample dryer or inlet of the sample system to verify the water content is at least as high as the highest value that you estimated during emission sampling. You may verify the water content based on any humidity parameter (e.g. mole fraction water, local dewpoint, or absolute humidity).

(6) Measure the humidified gas dewpoint,  $T_{\text{dew}}$ , and absolute pressure,  $p_{\text{total}}$ , as close as possible to the outlet of the sample dryer. Note that the dewpoint changes with absolute pressure. If the dewpoint at the sample dryer outlet is measured at a different pressure, then this reading must be corrected to the dewpoint at the sample dryer absolute pressure,  $p_{\text{total}}$ .

(7) The sample dryer meets the verification if the dewpoint at the sample dryer pressure as measured in paragraph (d)(6) of this section is less than the dewpoint corresponding to the sample dryer specifications as determined in §1065.145(e)(2) plus 2 °C or if the mole fraction of water as measured in (d)(6) is less than the corresponding sample dryer specifications plus 0.002 mol/mol.

(e) *Alternate sample dryer verification procedure.* The following method may be used in place of the sample dryer verification procedure in (d) of this section. If you use a humidity sensor for continuous monitoring of dewpoint at the sample dryer outlet you may skip the performance check in §1065.342(d), but you must make sure that the dryer outlet humidity is at or below the minimum value used for quench, interference, and compensation checks.

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